GEOLOGIC MAP OF THE MICHAELANGELO (H-12) QUADRANGLE OF MERCURY

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DESCRIPTION OF MAP UNITS

PLAINS MATERIALS

pvs VERY SMOOTH PLAINS MATERIAL—Forms smooth, featureless plains on floors of c_4 and c_5 craters (for example, within Bashō, –32°, 170°; FDS 0166846). *Interpretation:* Impact melt sheet and clastic fallback debris associated with host crater

ps SMOOTH PLAINS MATERIAL—Widespread throughout map area in commonly contiguous patches May also occur as primary floor material in c_4 and c_3 craters and as crater-fill material in c_3 to c_1 craters. Surface planar to gently undulating. Appears sparsely cratered at Mariner 10 resolutions (FDS 0166837). *Interpretation:* Origin of regional deposits uncertain, but they most likely consist of volcanic flows analogous to those of lunar maria. Alternatively, could be associated with ballistic debris of multiring basins that had a large melt component. Primary crater-floor deposits probably consist of impact melt and clastic debris that are slightly more degraded than unit pvs due to greater age

psi NTERMEDIATE PLAINS MATERIAL—Forms planar to undulating surfaces that have higher crater density than smooth plains material, but are less heavily cratered than intercrater plains material. May locally fill floors of c_3 to c_1 craters. Gradational with smooth plains material in some places (as at –52°, 137°) and with intercrater plains material in others (–66°, 142°). *Interpretation:* Probably similar to smooth plains unit, but older; may consist of volcanic flows or distal ejecta of multiring basins or possibly a complex mixture of both

pi INTERCRATER PLAINS MATERIAL—Forms extensive, undulating to hummocky surfaces between areas of large, overlapping craters. In detail, displays complex topography of coalescing secondary craters. Appears to predate most map units, but locally may overlie c_1 crater rims and numerous ghost craters. *Interpretation:* Complex unit including crater and basin deposits and possibly volcanic flows. Probably lithologically equivalent to lunar highlands megaregolith

BASIN MATERIALS

brl BEETHOVEN BASIN RIM MATERIAL—Radially lineated and grooved material outside rim of Beethoven (basin centered at –20°, 124°). Extensive to east and southeast of basin; in narrow band directly to west. Large crater chains (unit csu) aligned with radial texture. *Interpretation:* Ejecta produced by impact that formed Beethoven. Radial texture due to ballistic deposition of both melt and clastic debris. Some lineations may be structural in origin. Exact age uncertain; density of superposed primary impact craters (table 1) suggests a post-Caloris, late c_3 age, but may be as old as early c_2 due to large range of error in crater age estimate

cvs CALORIS GROUP, VAN EYCK FORMATION, SECONDARY CRATER FACIES—Overlapping craters larger than 20 km in diameter that appear to have formed simultaneously; in two clusters near west map border. Southern cluster (–49°, 182°) superposed on Dostoevskij Basin materials. *Interpretation:* Secondary impact craters from the Caloris Basin impact. Form, distribution, and resemblance both to lunar basin secondaries and to Caloris secondaries outside map area suggest similar origin

trl TOLSTOJ BASIN RIM MATERIAL—Radially lineated and grooved material outside rim of Tolstoj (basin centered at –16°, 165°). Extensive south of basin, but appears embayed by intercrater plains material to southeast. Large crater chains (unit csu) aligned with radial texture. *Interpretation:* Ejecta produced by the impact that formed Tolstoj. Radial texture due to ballistic deposition of melt and clastic debris. Some lineations may be structural in origin. Density of superposed primary impact craters (table 1) suggests a pre-Caloris, c_2 or c_1 age

drl DOSTOEVSKIJ BASIN RIM MATERIAL—Radially lineated and grooved material outside rim of Dostoevskij (basin centered at –44°, 176°). Extensive north and south of basin, but greatly restricted to east because of nondeposition or overlap by younger units. Extent of material to west cannot be determined due to terminator position just west of basin rim. Large crater chains and clusters (unit csu) aligned with radial texture. *Interpretation:* Ejecta produced by the impact that formed Dostoevskij. Radial texture due to ballistic deposition of melt and clastic debris. Some lineations may be structural in origin, particularly in the area at –40°, 174°, where the Dostoevskij rim intersects a ring of the preexisting Barma-Vincente Basin. Density of superposed primary impact craters (table 1) suggests a pre-Caloris, c_1 age

m MASSIF MATERIAL—Forms generally isolated, equant to rectilinear massifs that protrude through adjacent units. Type area: –50°, 174°; FDS 0166843. *Interpretation:* Fragments of rings from nearly obliterated multiring basins Barma-Vincente, Hawthorne-Riemenschneider and Eitoku-Milton. Probably consist of brecciated autochthonous rocks and melt rocks produced by the basin impact. Used in conjunction with arcuate ridge segments and scarps to delineate basin rings

CRATER MATERIALS

CRATER MATERIALS—Craters ≥30 km in diameter. *Interpretation:* Impact crater materials of various degrees of degradation and infilling. Rate of degradation may be accelerated by adjacent impact events; therefore, stratigraphic significance of morphology is only approximate. Morphologic classification based on system of N. J. Trask (McCauley and others, 1981)

c_5 Material of craters with very fresh rim crest, terraces, radial texture, rays, and few or no superposed craters—Floor-wall contact very sharp. Floored by very smooth plains material (example: Bash~~o~~, –32°, 170°)

cp_5 Central-peak material—May consist of single peak, elongated peak, or peak dusters (a function of increasing crater size). *Interpretation:* Uplifted, brecciated autochthonous rocks formed contemporaneously with host crater

cr_5 Radially textured material and secondary crater field forming annulus outside some c_5 craters

cs_5 Satellitic-crater materials forming secondary crater clusters and chains—Host crater identified; associated with c_5 craters

c_4 Material of craters with continuous, slightly subdued rim crest—Few superposed craters; generally no rays visible. Floor-wall contact sharp. Floor consists mostly of very smooth or smooth plains materials (example: Hawthorne, –51°,116°)

cp_4 Central-peak material—May consist of single peak, elongated peak, peak clusters, or peak rings (a function of increasing crater size). *Interpretation:* Uplifted, brecciated autochthonous rocks formed contemporaneously with host crater

cf_4 Crater-floor material—Hummocky, rough-textured material forming floor deposits in some c_4 craters; usually embayed by plains material

cr_4 Radially textured material and secondary crater field forming annulus outside unit c_4—Shown only for craters >100 km in diameter

cs_4 Satellitic-crater materials forming secondary crater clusters and chains—Host crater identified; associated with c_4 craters

c_3 Material of craters with rounded but continuous rims—Flat floors generally filled with smooth plains or intermediate plains materials. Central peaks uncommon except in basins such as Michelangelo. Moderate number of superposed craters (example: Barma (Yakovlev), –41°, 163°)

cp_3 Central-peak material—May consist of single peak, elongated peak, peak clusters, or peak rings (a function of increasing crater size). *Interpretation:* Uplifted, brecciated autochthonous rocks formed contemporaneously with host crater

cf_3 Crater-floor material—Hummocky, rough-textured material forming floor deposits in some c_3 craters; usually embayed by plains material

cr_3 Radially textured material and secondary crater field forming annulus outside c_3 craters—shown only for craters >100 km in diameter

cs_3 Satellitic-crater materials forming secondary crater clusters and chains—Host crater identified; associated with c_3 craters

c_2 Material of craters with rounded, subdued rims and flat floors—Floor may be filled with either smooth plains or intermediate plains materials. No radial texture evident in exterior deposits. Many superposed craters (example: Sei, –64°, 90°)

cp_2 Central-peak material—Very rare single peak. *Interpretation:* Uplifted, brecciated autochthonous rocks formed contemporaneously with host crater

c_1 Material of flat-floored craters with low, discontinuous rim crests— No radially textured ejecta; no preservation of secondaries. Floor is filled with smooth plains or intermediate plains materials and is filled locally by ejecta blankets from adjacent craters. Large number of superposed craters (example: Milton, –26°,175°)

csu Satellitic crater material, undivided—Occurs as crater pairs, clusters, or chains that are satellitic to a larger host crater or basin. Location of host feature mostly uncertain. *Interpretation:* Secondary impact craters formed by ballistic erosion of subjacent terrain

CONTACT—Queried where doubtful; dotted where buried

SCARP—Probably a fault. Bar and ball on downthrown side

RIDGE—Interpreted as mare-type wrinkle ridge within smooth plains and intermediate plains materials; probably of compressive tectonic origin. Symbol on ridge crest

RIDGE SCARP—Associated with rupes structures; probably of compressive tectonic origin. Line marks base of slope; barb points downslope

DEPRESSION OF PROBABLE STRUCTURAL ORIGIN, LINEAR TO ARCUATE—Barbs point downslope

CRATER RIM CREST

CRATER RIM CREST, SUBDUED—Either degraded by age (c_1 and c_2 craters) or buried by later unit

IRREGULAR DEPRESSION—Possibly a collapse crater

BASIN RING CREST—Interpreted as part of basin ring of structural origin

MULTIRING BASIN RING—Subdued ring of large multiring basins Barma-Vincente, Bartok-Ives, Hawthorne-Riemenschneider, and Eitoku-Milton. Solid line indicates mappable structural or topographic element; dots indicate inferred ring position

AREA OF BRIGHT CRATER-RAY MATERIAL—Interpreted as fresh crater ejecta

AREA OF ABNORMALLY LOW ALBEDO

INTRODUCTION

The Michelangelo quadrangle is in the southern hemisphere of Mercury, where the imaged part is heavily cratered terrain that has been strongly influenced by the presence of multiring basins. At least four such basins, now nearly obliterated, have largely controlled the distribution of plains materials and structural trends in the map area. Many craters, interpreted to be of impact origin, display a spectrum of modification styles and degradation states. The interaction between basins, craters, and plains in this quadrangle provides important clues to geologic processes that have formed the morphology of the mercurian surface.

Several low-albedo features are evident in Earth-based views of the Michelangelo quadrangle (Davies and others, 1978, p. 15), but these features do not appear to correlate directly with any mapped terrain unit. Solitudo Promethei may correspond to a deposit of plains materials centered at –58°, 135°, and Solitudo Martis may correspond to similar materials at –30° to –40°, 90° to 100°. The color data (orange/ultraviolet) presented in Hapke and others (1980) likewise show no particular correlation with mapped terrain types. The “yellow” region (moderately high orange/ultraviolet) centered at –33°, 155° appears to correspond to a smooth plains deposit, but the region overlaps into adjacent cratered terrain.

Mariner l0 data include complete photographic coverage of the quadrangle at a resolution of about 2 km. In addition, twelve stereopairs cover scattered areas in the quadrangle (Davies and others, 1978, p. 114–115); these photographs were used to supplement the geologic interpretation. About 10° of longitude of the H-13 quadrangle (Solitudo Persephones Province) adjacent to the west is included in the map area because not enough Mariner 10 data were acquired of this quadrangle to justify the production of another map.

STRATIGRAPHY

ANCIENT BASIN MATERIALS

Systematic mapping of the Michelangelo quadrangle has revealed the presence of four nearly obliterated multiring basins These basins are here named for unrelated superposed, named craters, as was done for highly degraded lunar basins (Wilhelms and El-Baz, 1977). From oldest to youngest, the basins are: Barma-Vincente, centered at –52°, 162°; Bartok-Ives, centered at –33°, 115°; Hawthorne-Riemenschneider, centered at –56°, 105°; and Eitoku-Milton, centered at –23°, 170°. Diameters of the basin rings are given in table 1. The presence of these basins is indicated by three criteria: (1) isolated massifs (unit m) that appear to protrude through superposed materials; (2) arcuate segments of ridges (rupes) aligned with massif material; and (3) arcuate scarps aligned with both massifs and ridges.

Because none of the four basins has ejecta deposits that are preserved, the basins are assumed to be the oldest features in the map area; moreover, they are embayed or buried by all other units. The relative ages of the basins are given in table 1, based on the density of superposed primary impact craters and stratigraphic relations. These results are uncertain, as the crater density of heavily cratered terrain on Mercury ranges from 11.2 to 17.4 x 10^{-5} km^{-2} for craters of diameters 20 km or greater (Guest and Gault, 1976). The results obtained are consistent with a qualitative assignment of relative age that is based on position and size of these ancient basins.

The basins have largely controlled subsequent geologic processes in the map area. Large concentrations of smooth plains deposits are found within the basin boundaries and at the intersections of rings of different basins. Moreover, the trends of scarp segments, interpreted by some workers to be expressions of thrust faults associated with global compression (Strom and others, 1975; Dzurisin, 1978), are deflected into basin-concentric patterns at their intersection with basin rings. These relations have also been noted for ancient basins on both the Moon (Schultz, 1976) and Mars (Schultz and others, 1982; Chicarro and others, 1983).

In addition to the four multiring basins, an ancient two-ring basin, Surikov, is also evident at –37°, 125°. It is unique among the two-ring basins in the map area because, although the inner ring is well preserved and similar in morphology to peak rings of fresh basins such as Bach, the outer ring is almost totally obliterated. This morphology is similar to that of the lunar basin Grimaldi and is suggestive of an extended period of structural rejuvenation along the margins of the inner ring. Crater density on this basin suggests that it is one of the oldest in the map area (table 1).

OLDER PLAINS MATERIALS

The oldest recognizable plains unit in the map area is the intercrater plains material (unit pi), originally described by Trask and Guest (1975). This material is generally undulating to hummocky and appears to underlie tracts of cratered terrain, as evidenced by the superposition of many coalescing secondaries from adjacent large craters. In some areas, the intercrater plains material appears to embay c_1 craters, and it is found in all of the degraded basins described above. The origin of mercurian intercrater plains material remains unknown. Both volcanic (Strom and others, 1975; Trask and Guest, 1975; Strom, 1977) and impact-debris models (Wilhelms, 1976a; Oberbeck and others, 1977) have been proposed. The material is most likely polygenetic, including both crater and basin debris and possibly ancient volcanic flows. Physically and lithologically it resembles the lunar highlands megaregolith.

YOUNGER BASIN MATERIALS

At least seven basins in or partly in the Michelangelo quadrangle postdate or are contemporaneous with the last stages of deposition of intercrater plains material. Dostoevskij (–44°, 176°) displays only one ring; presumably the inner peak ring is buried by plaint material. The ejecta from this basin (unit drl) may be mapped as far as 450 km from the rim; several secondary crater chains occur southeast of the rim. Although Dostoevskij was considered a type example of a c_3 large crater (McCauley and others, 1981), crater counts indicate that it is much older (table 1). The Dostoevskij impact probably occurred in c_l time.

The Tolstoj Basin is centered in the Tolstoj quadrangle at –16°,165° (Schaber and McCauley, 1980). It consists of three discontinuous rings (table 1); ejecta (unit trl) may be mapped as far as 350 km from the outermost ring. The density of superposed craters suggests an age older than the Caloris Basin, either late c_1 or early c_2. A small. unnamed basin at –48°, 136° may also have formed in this time interval (table 1), but its age is uncertain due to its partial burial by ejecta from crater Delacroix (–44°, 129°).

The effects of the Caloris impact on the map area are not immediately apparent. No Caloris ejecta are evident, and most structural trends appear to be unrelated to this impact. However, near the west border of the map are two groups of large, overlapping craters centered at –31°, 183° and –49°, 182°. These groups appear to have formed simultaneously, as no specific stratigraphic sequence is evident. On the basis of crater clusters of similar appearance in the lunar highlands, which have been interpreted as Imbrium and Orientale basin secondaries (Schultz, 1976; Wilhelms, 1976b; Eggleton, 1981), these crater groups are interpreted to be Caloris Basin secondaries. Following the terminology developed by McCauley and others (1981) we have assigned them to the Van Eyck Formation, Secondary-Crater Facies (unit cvs). These secondaries overlie Dostoevskij ejecta and thus confirm that basin as pre-Caloris. We determined a reference crater density for Caloris in the Shakespeare quadrangle (table l) in order to correlate basin ages to that stratigraphic datum.

The Beethoven Basin (–20°,124°), partly exposed in the Michelangelo quadrangle, consists of one ring 660 km in diameter. The exact age of Beethoven is uncertain; the density of superposed primary impact craters (table 1) suggests a post-Caloris, late c_3 age, but it may be as old as early c_2 age due to the large range of error in the crater age estimate. The ejecta from Beethoven (unit brl) are very extensive east and southeast of the basin rim and are mappable as far as 600 km downrange from the rim. However, ejecta appear to be almost absent on the west side of the basin. The reason for this asymmetry is unclear; possibly Beethoven is the result of an oblique impact that produced an asymmetric ejecta distribution (Gault and Wedekind, 1978), or possibly basin radial texture in the western rim area has been obliterated by ejecta from Vālmiki.

The other basins in the quadrangle are Michelangelo, Vālmiki, and Bach (table 1). All contain two rings and appear to be transitional between large craters and multiring basins. All postdate the Caloris event.

YOUNGER PLAINS MATERIALS

The oldest of the three younger plains units is intermediate plains material (unit psi). It forms planar to gently undulating surfaces and both embays tracts of cratered terrain and fills crater floors. Both upper and lower contacts with other plains units are gradational. These gradations suggest that the assignment of age to plains deposits on Mercury is partly dependent on the relative abundance of superposed secondary craters, whose densities vary widely as a function of nearby source craters.

The smooth plains unit (ps) forms both widespread regional deposits and crater floor material. The regional deposits are significantly less cratered than those of other plains units, although they typically display crater densities comparable to older lunar maria (Murray and others, 1974). The unit characteristically contains mare-type ridges, although no flow fronts have been observed in the map area.

The origin of the younger plains materials is critical to mercurian geologic history. They are thought to be either volcanic (Strom and others, 1975; Trask and Strom, 1976) or a facies of ballistic ejecta (Wilhelms, 1976a; Oberbeck and others, 1977). The interpretation favored here is that large parts of these smooth plains are of volcanic origin, because (1) they are distributed regionally and have no obvious source for ballistic deposition; (2) large tracts are confined within basin depositional environments, analogous to the lunar maria; (3) indirect evidence elsewhere on Mercury exists for volcanic modification of impact craters (Schultz, 1977); and (4) possible volcanic collapse craters are associated with plains-filled craters (–61°, 161° and –57°, 102°). Parts of smooth plains deposits may be a complex mix of overlapping crater ejecta.

A very smooth plains unit (unit pvs) occurs only as floor material in younger c_4 and c_5 craters. The material is interpreted to be crater impact melt and associated clastic debris.

CRATER MATERIALS

Crater deposits are mapped stratigraphically according to a morphologic degradation sequence devised by N. J. Trask (McCauley and others, 1981). This method assumes that (1) all craters of a given size range initially resemble fresh craters and (2) degrees of impact erosion are constant for all craters within a morphologically defined sequence. Although these conditions hold generally, degradation may be accelerated locally by adjacent impact events and flooding by plains materials and, rarely, may be decelerated by structural rejuvenation of topographic elements of craters. Thus, the stratigraphic significance of crater morphology is only approximate. By analogy with lunar materials, all mapped crater materials are thought to be of impact origin. Only craters larger than 30 km in diameter are mapped.

The large basins of the Michelangelo quadrangle have been dated relatively by counting the cumulative density of superposed primary impact craters that have diameters greater than 20 km (table 1). This technique has proven to be of great value in dating lunar basins (Wilhelms, in press), where obvious superposition relations do not exist. Results of these crater counts indicate that Dostoevskij, presumed to be of c_3 age (McCauley and others, 1981), is actually one of the oldest basins in the map area (early c_1). Thus, strict morphological determination of stratigraphic age may be significantly in error.

Throughout the map area are crater clusters and chains (unit csu) that are satellitic to both craters and basins, but the host crater may not be identifiable everywhere. This material is interpreted to be from secondary impact craters of a wide variety of ages. Many mercurian secondaries are well preserved and have sharp, unrounded rims. This morphology is probably a consequence of the stronger mercurian gravity, relative to the Moon. that produces higher impact velocities for crater ejecta on the mercurian surface (Gault and others, 1975; Scott, 1977).

STRUCTURE

The rings associated with the four ancient basins (table 1) are the oldest structures within the mapped area and have to some degree controlled the structural trends of subsequent tectonism. Several of the lobate ridges described by Strom (1979) follow arcuate patterns along rings of the Barma-Vincente Basin; Hero Rupes is an example. These lobate ridges appear to be of compressive tectonic origin and, although global in distribution, may be deflected locally by the presence of preexisting, basin-related structure. Additional effects of these ancient basin rings may be seen where the rim of Dostoevskij intersects the Barma-Vincente rings (for example, the horst at –40°, 174°); parts of the Dostoevskij rim appear to have been structurally accented by this intersection. These relations are similar to those associated with highly degraded, ancient basins on Mars (Chicarro and others, 1983). The smooth plains material (unit ps) displays numerous ridges that generally resemble lunar mare ridges and also are considered to be of tectonic origin. The mercurian ridges are probably related to minor compressive stresses that postdate smooth plains emplacement. Numerous lineaments are associated with basin rim material (units drl, trl, brl), but most of these lineaments are probably related to ejecta deposition. A few may be faults, particularly where they occur close to preexisting basin rings.

GEOLOGIC HISTORY

The interpretable geologic history of the Michelangelo quadrangle begins with the formation of the four ancient, multiring basins. From oldest to youngest, they are: Barma-Vincente, Bartok-Ives, Hawthorne-Riemenschneider, and Eitoku-Milton. These basins presumably formed during the period of heavy bombardment inferred from lunar history (Wilhelms, in press). Contemporaneous with their formation and shortly afterward, was the deposition of the intercrater plains material. This unit has a complex history of deposition; it was reworked in place and probably includes brecciated plutonic rocks and possibly ancient volcanic flows. Deposition of the intercrater plains material was waning as the next oldest basins (Dostoevskij, Tolstoj) were formed. Partly overlapping their formation was the deposition of the intermediate plains material, probably emplaced partly as distal basin ejecta and partly as volcanic flows. Regional deformation of these plains units by compressive tectonics, forming scarps, was contemporaneous with there deposition.

The Caloris impact occurred during the time of formation of the intermediate plains material. In the map area, Caloris ejecta may be present at depth or may have been reworked locally by adjacent impacts. Two groups of Caloris secondary craters (unit cvs) are evident. Shortly after the Caloris impact, extensive smooth plains material, probably of volcanic origin, was deposited. During this period of deposition occurred the impacts of the last of the major basins (Beethoven, Michelangelo, Vālmiki, and Bach). Minor tectonic activity continued as scarps and lunar mare-type wrinkle ridges developed within the smooth plains materials.

The cratering rate declined rapidly as the c_3, c_4 and c_5 craters were produced. Regolith production continues to the present day on all units. If the geologic history of the Moon is a guide, most of the events discussed were essentially complete within the first 1.5 to 2.0 billion years of Mercury’s history (Murray and others, 1975). A summary of global mercurian geology may be found in Guest and O’Donnell (1977) and Strom (1979).

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NOTES ON BASE

This map sheet is one of a series covering that part of the surface of Mercury that was illuminated during the Mariner 10 encounters (Davies and Batson, 1975). The source of map data was the Mariner 10 television experiment (Murray, 1975).

ADOPTED FIGURE

The map projections are based on a sphere with a radius of 2,439 km.

PROJECTION

The Lambert conformal conic projection is used for this sheet, with a scale of 1:4,623,000 at lat –22.5°. Latitudes are based on the assumption that the spin axis of Mercury is perpendicular to the plane of the orbit. Longitudes are positive westward in accordance with the usage of the International Astronomical Union (IAU, 1971). Meridians are numbered so that a reference crater named Hun Kal (lat –0.6°) is centered on long 20° (Murray and others, 1974; Davies and Batson, 1975).

CONTROL

Planimetric control is provided by photogrammetric triangulation using Mariner 10 pictures (Davies and Batson, 1975). Discrepancies between images in the base mosaic and computed control-point positions appear to be less than 5 km. The base mosaic was tied to a much later iteration than the base mosaics of other Mercury quadrangles. Discrepancies as large as 20 km were adjusted along the north edge to match the Tolstoj (H-8) and Beethoven (H-7) quadrangles. No attempt was made to join the Discovery (H-11) quadrangle to the east or the Bach (H-15) quadrangle to the south. Discrepancies as large as 40 km exist on these boundaries.

MAPPING TECHNIQUES

Mapping techniques are similar to those described by Batson (1973a, b). A mosaic was made with pictures that had been digitally transformed to the Lambert conformal conic projection. Shaded relief was copied from the mosaics and portrayed with uniform illumination with the sun to the west. Many Mariner 10 pictures besides those in the base mosaic were examined to improve the portrayal. The shading is not generalized and may be interpreted with nearly photographic reliability (Inge, 1972; Inge and Bridges, 1976).

Shaded relief analysis and representation were made by P. M. Bridges.

NOMENCLATURE

All names on this sheet are approved by the International Astronomical Union (IAU, 1977, 1980).

H-12:	Abbreviation for Mercury (Hermes) sheet number 12.
H 5M –45/135 G:	Abbreviation for Mercury (Hermes) 1:5,000,000 series; center of sheet, lat –45°, long 135°; geologic map, G.

A small part of the H-13 quadrangle is included on this sheet because insufficient data are available to justify preparation of a separate sheet.

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